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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/588,210

08/02/2006

Bardo Schmitt

293310US0PCT

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03/20/2008

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ALEXANDRIA, VA 22314

EXAMINER

REDDY, KARUNA P

ART UNIT

PAPER NUMBER

1796

NOTIFICATION DATE

DELIVERY MODE

03/20/2008

ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No. 10/588,210	Applicant(s) SCHMITT ET AL.	
	Examiner KARUNA P. REDDY	Art Unit 1796	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 30 January 2008.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-11 and 13-31 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-11, 13-29 and 31 is/are rejected.
- 7) ☒ Claim(s) 30 and 31 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. This office action is in response to the amendment filed on 1/30/2008.

Applicants amended claims 1-11 and 13-26; and added claims 28-31. Claims 1-11 and 13-31 are currently pending in the application.

2. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Double Patenting

3. Claims 1-11, 13-21 and 26-31 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-11, 13 and 15-27 of copending Application No. 10/587,257.

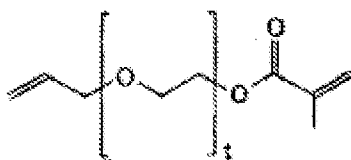
The rejection is adequately set forth in paragraph 3 of office action mailed 9/11/2007.

4. Claims 1, 7, 11, 13-17 and 23-31 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1, 7, 12, 15-19, 21-30 of copending Application No. 11/547,238 in view of Maruyama et al (US 5, 270, 439).

The rejection is adequately set forth in paragraph 4 of office action mailed 9/11/2007.

Specification

5. The disclosure is objected to because of the following informalities: The specification on page 31, lines 25-29 discloses a "...compound of formula -



wherein s and t are greater than..." However, there is no reference to "s" in the formula (XIVb). Appropriate correction is required.

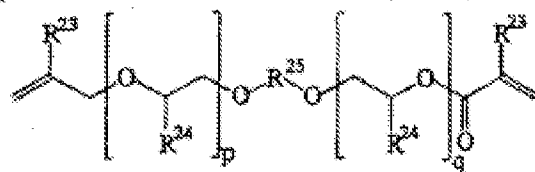
Claim Objections

6. Claim 31 is objected to because of the following informalities: Claim 31 recites "wherein s and t are greater than" However, there is no reference to "s" in the formula XIVb of claim 31. Appropriate correction is required.

Claim Rejections - 35 USC § 112

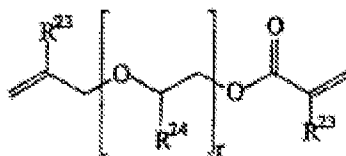
7. Claim 28 and 30-31 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claim 28 recites asymmetric crosslinkers with formulae -

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(XIII)

and/or of the formula (XIV)



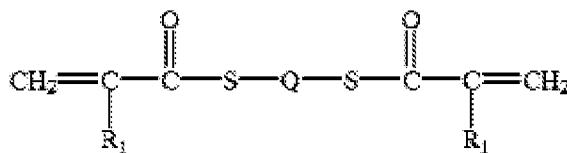
(XIV)

However, there is no reference to what "p, q and r" represent.

Claim Rejections - 35 USC § 103

8. Claims 1-11, 13-29 and 31 rejected under 35 U.S.C. 103(a) as being unpatentable over Smith et al (US 6, 342, 571 B1) in view of Maruyama et al (US 5, 270, 439) and Momoda et al (US 6, 698, 883 B2).

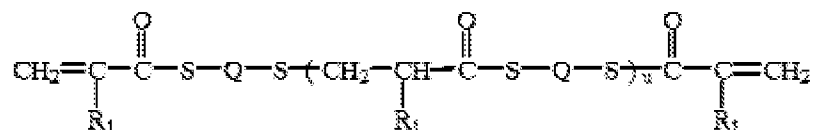
Smith et al disclose a polymerizable composition comprising (a) a mixture of thio(meth)acrylate functional monomers comprising (i) a first thio(meth)acrylate functional monomer represented by the following general formula I –



in which R₁ is hydrogen or methyl, and Q is a divalent linking group selected from linear or branched C₂-C₁₂ alkylene, C₄-C₁₂ cyclic alkylene, C₆-C₁₄ arylene and C₇-

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C₂₆ alkarylene (column 2, lines 46-64); and (ii) a second thio(meth)acrylate functional monomer represented by the following general formula II -

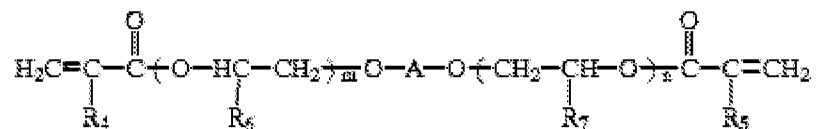


in which R₁ and Q have the same meanings as described for monomer a(i) and “u” is an integer from 1 to 10 (column 3, lines 1-14); (b) an aromatic monomer having at least two vinyl groups; (c) a polythiol monomer having at least two thiol groups; and (d) a comonomer selected from (i) an anhydride monomer having at least one ethylenically unsaturated group; (ii) a monomer having at least three (meth)acryloyl groups (column 3, lines 15-24). Each monomer and comonomer is selected such that a polymerizate of said polymerizable composition has a refractive index of at least 1.57 and an Abbe number of at least 33 (column 3, lines 39-42). The first thio(meth)acrylate functional monomer is present in an amount from 5 percent by weight to 49 percent by weight based on the total weight of the mixture of thio(meth)acrylate functional monomers (column 3, lines 59-65). The second thio(meth)acrylate functional monomer is typically present in an amount from 51 percent by weight to 95 percent by weight based on the total weight of the mixture of thio(meth)acrylate functional monomers (column 3, lines 66-67; column 4, lines 1-5). The mixture of thio(meth)acrylate functional monomers are typically present in the composition in an amount of at least 20

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percent by weight based on the total monomer weight of the polymerizable composition (column 5, lines 63-67; column 6, line 1).

The composition also comprises an aromatic monomer exemplified by 1,2-divinyl benzene (column 6, lines 11-12). The aromatic monomer is typically present in the polymerizable composition in an amount of at least 5 percent by weight (column 6, lines 30-33). Also present in the composition is a polythiol monomer having at least two thiol groups (column 6, lines 44-45). The polythiol monomer is typically present in the composition in an amount of at least 5 percent by weight (column 7, lines 55-57). The composition further comprises a comonomer which may be selected from an anhydride monomer having at least one ethylenically unsaturated group (column 8, lines 1-4) and is typically present in an amount of at least 1% by weight (column 8, lines 35-36). The polymerizable composition may optionally further comprise a radically polymerizable comonomer represented by the general formula (column 8, lines 47-60) and is present in amount of at least 2 percent by weight -



The polymerizable composition may further optionally comprise a monomer having a single ethylenically unsaturated radically polymerizable group exemplified by 2-hydroxyethyl methacrylate and styrene (column 11, lines 10-26). In an embodiment, the polymerizable composition comprises 20 percent by

weight to 80 percent by weight of the thio(meth)acrylate monomer mixture, from 5 percent by weight to 45 percent of the polythiol monomer (column 11, lines 38-43).

Polymerizates obtained from polymerization of the composition will be solid and preferably transparent e.g. suitable for optical applications. Solid articles that may be prepared include optical lenses (column 13, lines 36-43). See table 2 for refractive index, Abbe number and %transmittance. The mixture can be used to prepare photochromic articles, e.g. lenses (column 13, 50). The photochromic substances may be added to the polymerizable compositions of present invention prior to curing (column 15, lines 34-36).

Smith et al differs with respect to

- a) the formation of prepolymer (a) from (I), II and III and silent with respect to plastic having T_g greater than 80.0°C .
- b) asymmetric crosslinker.
- c) average diameter of a ball that does not damage the specimen being ≥ 18 .

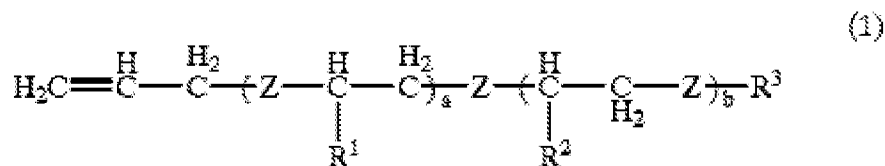
With respect to a), Maruyama et al teaches a curable composition suitable for the preparation of a cured product having various well-balanced properties such as optical uniformity and low water absorption and heat resistance (column 2, lines 41-46). The curable composition of the present invention may be prepared by previously synthesizing the prepolymer having a polythioether skeleton and mixing it with another polymerizable monomer (column 9, lines 26-

29). The structure of curable composition containing the prepolymer having a polythiol skeleton thus obtained has molecular terminal ends in the composition capped with polymerizable vinyl groups and has very good storage stability (column 12, lines 39-43). The curable composition, different from a composition comprising a mere mixture of thioether, a polythiol and another polymerizable monomer, which has the problems of poor stability and homogeneity of the cured product, is extremely stable without gelling, has substantially no elevation of the viscosity even when left to stand at room temperature for 20 hours or longer and the cured product obtained by curing the curable composition has a very good optical uniformity. See table 9, wherein the glass transition temperature is $\geq 80^{\circ}\text{C}$. Therefore, it would have been obvious to one skilled in the art at the time invention was made to prepolymerize (I), (II) and (III) and obtain a polymerizable mixture that has good storage stability and a cured product having good optical uniformity with a glass transition temperature $\geq 80^{\circ}\text{C}$.

With respect to b), Momoda et al teach that when a combination of particular allyl ether or allythio ether compound and other radically polymerizable monomer, is mixed with a photochromic compound, the obtained curable composition exhibits excellent photochromic properties as well as excellent base material properties such as high hardness and high heat resistance (column 2, lines 22-37). The invention is concerned with a curable composition comprising (column 2, lines 38-55).

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(A) an allyl ether or allylthio ether compound represented by the following general formula (1),

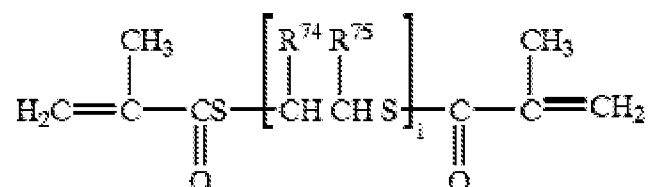


wherein R^1 and R^2 are, independently from each other, hydrogen atoms or alkyl groups, R^3 is an alkyl group, an acyl group, an acryloyl group, a methacryloyl group, a vinyl group or a styryl group, Z is an oxygen atom or a sulfur atom, and a and b are, independently from each other, from 0 to 20 in average, a+b being from 3 to 20;

It is noted that allylthio ether of general formula (1) is an asymmetric crosslinker which is a radical polymerizable monomer with at least two terminal olefinic groups which differ in reactivity, and do not contain carbonyl groups connected to carbon atom of a terminal double bond and an oxygen adjacent to the Y group of presently claimed asymmetric crosslinker i.e. "a" grouping of formula 1 above. Many of the existing curable compositions that have been known for their relatively excellent photochromic properties exhibit low hardness and low heat resistance even after curing. However, curable composition using the above mentioned particular monomer does not permit the hardness and heat resistance to decrease greatly after it has been cured. Concrete examples of the allyl ether compound that can be used include methacryloxypolyethylene glycol allyl ether, methacryloxypolyethylene glycol-polypropylene glycol allyl ether and acryloxypolyethylene glycol allyl ether (column 3, lines 59-60; column 4, lines 1-

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17). It is desired that the other radically polymerizable monomer is polymerized with a bifunctional or polyfunctional polymerizable monomer herein after referred to as a "high hard monomer" (column 4, lines 27-30). Examples of high hard monomers include those represented by the general formula 6 depicted below -



wherein R^{74} and R^{75} may be same or different, and are hydrogen atoms or methyl groups and "i" is an integer of from 1 to 10 (column 9, lines 8-10). The cured products obtained from the above compound, represented by general formula 6, exhibits high refractive indexes of not less than 1.56 and high Abbe numbers, lending themselves well for obtaining photochromic lenses. Therefore, it would have been obvious to add allyl ether compounds (i.e. an asymmetric crosslinker) such as methacryloxypolyethylene glycol allyl ether (reads on allyl polyethylene glycol methacrylate of present claim) to the composition of Smith et al in view of Maruyama et al, for above mentioned advantages.

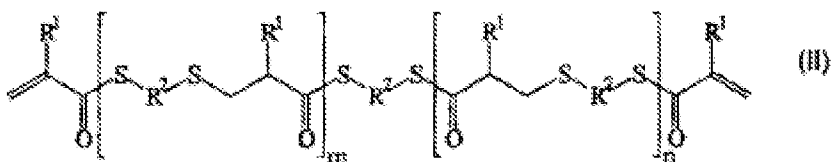
With respect to c), average diameter of a ball that does not damage the specimen in the falling ball test is ≥ 18 , is an inherent property of plastic obtained by curing the polymerizable mixture of Smith et al in view of Maruyama et al and Momoda et al.

Allowable Subject Matter

9. Claim 30 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

It is noted that present claim 30 is directed to a mixture for the production of transparent plastics, comprising:

- a) a prepolymer, produced from compounds of the formula (I) and (II)

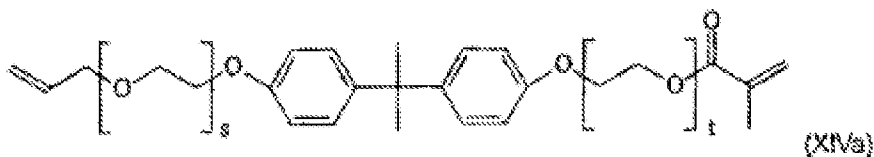


and alkylthiols or polythiols;

- b) at least one radical polymerizable monomer (A) with at least two methacrylate groups;

c) aromatic vinyl compounds; and

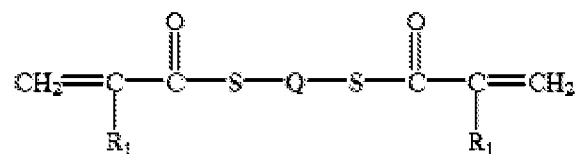
- d) an asymmetric crosslinker which is of the formula -



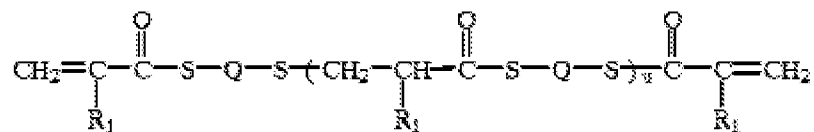
wherein s and t are greater than or equal to zero and the sum s + t is in the range from 1 to 20.

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The closest prior art, viz., Smith et al (US 6, 342, 571 B1), Maruyama et al (US 5, 270, 439), Momoda et al (US 6, 698, 883 B2) taken individually or in combination, does not disclose or suggest the polymer composition of present claims. Thus Smith et al teach a polymerizable composition comprising a mixture of thio(meth)acrylate monomers comprising (i) a first thio(meth)acrylate functional monomer of following general formula –



and (ii) a second thio(meth)acrylate functional monomer represented by the general formula II -



(b) an aromatic monomer having at least two vinyl groups and c) a polythiol monomer having at least two thiol groups; Maruyama et al teach a curable composition prepared by previously synthesizing the prepolymer having a polythioether skeleton; and Momoda et al teach curable composition comprising allyl polyethylene glycol methacrylate and is different from the asymmetric crosslinker of claim 30.

Response to Arguments

10. Applicant's arguments with respect to rejection of claims 1-12 and 14-27 under 35 U.S.C. 103(a) as being unpatentable over Smith et al (US 6, 342, 571 B1) in view of Maruyama et al (US 5, 270, 439); claim 13 under 35 U.S.C. 103(a) as being unpatentable over Smith et al (US 6, 342, 571 B1) in view of Maruyama et al (US 5, 270, 439) and Momoda et al (US 6, 698, 883 B2); claim 25-26 under 35 U.S.C. 112 second paragraph; and claim 23 under 35 U.S.C. 101, have been considered but are moot in view of the new ground(s) of rejection, amendment or cancellation of the claims.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will

the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Contact Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to KARUNA P. REDDY whose telephone number is (571)272-6566.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Vasu Jagannathan can be reached on (571) 272-1119. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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/Karuna P Reddy/

Examiner, Art Unit 1796

/VASUDEVAN S. JAGANNATHAN/

Supervisory Patent Examiner, Art Unit 1796